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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/342,210	06/29/1999	MICHIO KOHNO	684.2861	6231

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EXAMINER

CARIASO, ALAN B

ART UNIT	PAPER NUMBER
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2875

DATE MAILED: 02/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/342,210

Applicant(s)

KOHNO, MICHIO

Examiner

Alan Cariaso

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-6, 12-16, 19-24 and 29-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-5, 12-15, 19-24 and 29-41 is/are rejected.
- 7) ☒ Claim(s) 6 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 18, 2003 has been entered. Also, receipt of a preliminary amendment filed December 04, 2003 is acknowledged. Among claims 2-6, 12-16, 19-24 and 29-41 that currently pending, claims 2, 12, 22, 29, 34, 36, 38 and 40 have been amended.

Drawings

2. The drawings were received on November 21, 2003. These formal drawings are approved by the examiner.

Claim Objections

3. Claim 36 is objected to because of the following informalities: Claim 36, line 7, the phrase "said converting optical system is configured so that *said a* light entrance ..." appears to be missing an object (namely so as to read as --said optical fiber bundle has a light entrance--) as done in claims 12 and 40. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 2-5, 12-15, 20, 21, 30, 31 and 34-41 are rejected under 35 U.S.C. 102(b) as being anticipated by SHIRAISHI (US 5,719,704).

6. In regards to claims 2, 4, 5, 12, 14, 15, 20 and 21, SHIRAISHI discloses an illumination optical system (figs. 24 & 27) comprising: an imaging optical system forming an image of light source ("1" being an Hg lamp with its center at the 1st focal point of elliptical mirror 2, col. 32, lines 48-53 or col.36, lines 3-5) at a predetermined plane ("A1" disposed at the 2nd focal point of elliptical mirror 2, col.32, lines 50-53); a converting optical system (fly-eye lens "100" spaced from "4" or "102" in fig.24; dual-compound series lenses "4" & "105" in fig.27) directing light from the light source image to a total reflection type light transmitting element or optical fiber bundle (103-fig.24 or rod 106-fig.27, col.35, lines 41-42 and lines 47-50) that inherently defines also a distributed refractivity type optical fiber bundle, wherein said converting optical system is configured so that the light transmitting element (of claim 2) or said optical fiber bundle (of claim 12) has a light entrance surface (A11-fig.27) which is disposed in a Fourier transform relation (col.36, lines 11-12) with said predetermined plane (A1).

7. In regards to claims 3, 13, 30 and 31, which recite the phrases "wherein the light source image formed by said imaging optical system has an illuminance which is larger

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in a portion adjacent an optical axis of the light transmitting element than in a peripheral portion about the optical axis” (claims 3 and 13) and “wherein said converting optical system is effective to make a luminous intensity distribution upon a light entrance surface of said light transmitting element (claim 30) or said optical fiber bundle (claim 31) into a distribution of a shape without a central void”, any recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. Otherwise, these intended uses, conditions or functions are not given patentable weight, if no difference in structure from the prior art is claimed that results in these conditions. If the prior art structure is capable of performing the intended use, then it meets the claim. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

8. In regards to claims 34-41, SHIRAISHI discloses an exposure apparatus that includes the illumination optical system above (1-5, figs. 24 & 27) and further a projection optical system (11) projecting a pattern of a mask (9) onto a wafer (13); a device manufacturing method of applying a resist (col.2, lines 9-10) to the wafer (13); transferring, by exposure, the pattern of the mask (9) onto the wafer (13) by use of the exposure apparatus (figs.24 & 27) and developing the wafer (13) having the pattern transferred thereto (cols.1-2); wherein said converting optical system is configured so that the light transmitting element (of claims 34 & 38) or said optical fiber bundle (of claims 36 & 40) has a light entrance surface (A11-fig.27) which is disposed in a Fourier transform relation (col.36, lines 11-12) with said predetermined plane (A1).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 19, 22-24, 29, 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over SHIRAISHI et al (US 5,719,704) in view of OMATA (US 5,218,660).

11. In regards to claim 19, SHIRAISHI discloses applicant's claimed invention including the optical fiber bundle (106) having a light entrance (A2) of a rectangular shape (col.35, lines 45-46) and the optical fiber bundle (106) comprises a total reflection type. However, SHIRAISHI does not disclose a light exit face of arcuate shape of the optical fiber bundle.

12. OMATA teaches an optical fiber bundle (5) with a light entrance surface (5a) of rectangular shape and a light exit face (5b) of arcuate shape (col.4, lines 13-25) for the purpose of transforming light from lens (4) to emit with a arcuate cross-sectional shape and uniform light intensity that would fit into opening (9) of slit plate (6) to illuminate the mask surface with an arcuate light image having a uniform intensity (col.4, lines 50-57).

13. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the exposure/illumination device of SHIRAISHI et al to include the type of light transmitting element or optical fiber bundle as taught by OMATA in order to illuminate the mask with arcuate light image having a uniform intensity.

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14. In regards to claims 22-24, 29, 32 and 33, SHIRAISHI discloses applicant's claimed invention including the light transmitting element comprising an optical rod (106-fig.27 or 203a,b-fig.29) and at least the light source being a laser light source (80-fig.17, col.26, lines 38-41). The optical rod or light pipe is considered to inherently produce the effect of a luminous distribution of a shape without a central void as claimed in claims 32 and 33. However, SHIRAISHI does not disclose a plurality of light sources or laser light sources.

15. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the illumination optical system of SHIRAISHI to include at least another or plural light sources in order to either form plural images of the light sources or increase the amount or intensity of light reaching the predetermined plane especially useful in increasing visibility of the object or light source(s) and in exposure of a wafer to effectively form a distinct pattern thereon from a mask.

Allowable Subject Matter

16. Claims 6 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

17. Applicant has traversed the original rejection of claims 2-7, 12-17, 19-24 and 29-41 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description

requirement, specifically in regards to the converting optical system being arranged to place the predetermined plane and a light entrance surface of the light transmitting element / optical fiber in a Fourier transform relation. The specification has been reviewed to (noted in pages 10-11 in the specification) have adequate support for such claimed subject matter. Therefore, this rejection has been withdrawn.

18. Applicant also traverses the original rejection of at least claims 2-5, 12-15, 19-21, 30, 31 and 34-41 rejected under 35 U.S.C. 102(b) as being anticipated by OMATA (US 5,218,660). Applicant basically argues that OMATA does not provide the Fourier transform relation because the converting optical system disclosed by OMATA do not resemble the lens plus lens arrangement of applicant's figures 8 and 13, of which the applicant considers to be among a few other optical systems that satisfy the Fourier transform relation. Applicant has provided a table (page 14 of applicant's response) listing the embodiments or figures that have the converting optical system which does and does not satisfy the Fourier transform relation.

19. In response, the reference to SHIRAISHI et al (US 5,719,704) has been applied to the claims as meeting the converting optical system that includes at least a lens plus lens converting optical system that satisfy a Fourier transform relation (col.33, lines 44-56; col.36, lines 3-18) as detailed above. Furthermore, SHIRAISHI teaches that optical systems that include fly-eye lens also satisfy a Fourier transform relation (col.5, lines 3-15; col.6, lines 17-25; col.12, lines 55-58; col.17, lines 41-45; col.19, lines 5-39). As disclosed and taught by SHIRAISHI '704, optical systems that include at least a fly-eye lens (similar to the prior art of OMATA '660) also meets the Fourier transform relation as

well as a converting lenses in series. Therefore, there is further question and doubt that such optics configured to meet the Fourier transform relation being limited to the converting optics as listed in applicant's table and as stated in applicant's arguments.

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. A publication to George Stroke, titled "Coherent Optics and Holography" shows at least Fourier-transform relation for a 'perfect' lens system or dual lens (pp.26-27, 118-119) and some equations of Fourier-transform theory (pp.164-165).

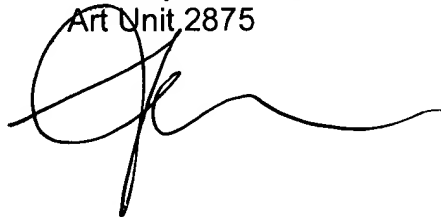
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Cariaso whose telephone number is (571) 272-2366. The examiner can normally be reached on 9-5:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (571) 272-2378. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Cariaso
Primary Examiner
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A handwritten signature in black ink, appearing to be 'AC' followed by a stylized flourish.

AC
February 4, 2004